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Abstract: Design is said to be central in unifying a holistic understanding of complex systems. It must amalgamate knowledge from 'art', 'literature', 'music', 'philosophy', 'math', 'science', 'technology', 'social science' and more, with its own understanding. But within these subjects are more defined individual interests that must interweave and complement other qualities. This paper presents a glimpse of what lies underneath the disciplinary institutional nomenclature that administers and organizes knowledge into collective identities that may not usually interact beyond the boundary of a subject. Under the guise of 'bridging the gaps' between STEM subjects (science, technology, engineering math) and non-traditional partners such as arts, humanities, or social science, efforts to expose diverse interests in sustainable urbanism for São Paulo are explained here. Towards consilience best describes the intention and willingness of diverse disciplinary perspectives that come together and share expertise and knowledge in the service of sustainability.

Key words: Sustainability, Design, Consilience, São Paulo, Systems, Ecology, Individualism

1. Introduction

The ideas associated with sustainability seemingly penetrate shallow and deep levels of human consciousness. They are reflected in 'promotional material' for goods and services, represented in 'packaging for soap powder', an aspiration for 'public transport systems' and central to calls for 'reduced consumption or lifestyle changes' [10]. In Great Britain since the 1980s sustainable design has evolved through what has been referred to as 'green design' and then 'ecological design' [5]. Pauline Madge [20], as pointed out by Aprile [2], references its ecological root from the *Dictionary of Green Ideas* by John Button, meaning 'the capacity of a system to maintain a continuous flow of whatever each part of that system needs for a healthy existence.' Consequently, in the early part of the twenty first century sustainability is a 'buzzword both among scholars and professionals' [9]. Aprile [2] makes it clear that 'from the very beginnings of the notion, sustainability has been a concept mixed with sustainable development.' This is clear in Brundtland's [4] 'common future' text, which challenges humanity to make development sustainable—'to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs.' Clark abbreviates this as 'concerned with guaranteeing a level of well-being for current *and future* generations' [7]. However, within 'sustainable development' there are over seventy definitions in use [8] that assist 'campaigners for greater global equality between nations, huge international corporations and local housing associations' [24]. It seems that the idea of sustainability has captured the imagination of many.

Sustainability is therefore increasingly relevant to urban design as we embark on an age when the majority who may influence world ecology is the urban dweller, now accounting for more than half of the world's population. But how wide is the scope of those concerned with sustainable development? This paper will answer this question in part by identifying some academic concerns of those interesting in aligning research to sustainable urban development. Ecology and systems combine in early references for sustainability. But when sustainable urban systems are discussed as requiring an integrated approach, how far does this extend in terms of academic and professional knowledge? This question must be investigated if non-scientific perspectives are to be incorporated such as the possibilities offered by the arts' view of 'sustainability and trash aesthetic' [28]. Excluding this wider perspective, some argue there are five key thematic infrastructure areas for achieving resource efficient cities: building energy efficiency, waste management, sustainable urban transport, water/wastewater, and urban ecosystem management [17]. However, beyond an already challenging agenda to unite such distinct concerns, dialogue is rarely holistic enough to capture the subtle nuances of disciplinary knowledge spanning science, social science, humanities and the arts. Yet, some argue cities need to be thought about in the widest possible sense [18]. This challenges assumptions arising from a systems thinking focus on infrastructure & interdisciplinary convention that may be limited by the number of participating actors. Politics, housing, transport, work, culture, social affairs, education, the arts, are a few random perspectives. The urban object represents a common interest for unified points of view at a scale with few if any direct comparison.

This paper reports on a research initiative to identify and align interest in sustainable urban development from the perspective of design in collaboration with geography through close collaboration with geographer Dr. Ed Brown at Loughborough University (LU). Through exploiting the potential for a relationship between design and geography, the initiative received funding from the Engineering and Physical Sciences Research Council (EPSRC) in the United Kingdom to support two seminars and related activities to enrich ongoing collaboration between academics at LU and the University of São Paulo (USP). The purpose was to facilitate future development of transdisciplinary approaches to sustainable development by integrating humanities, social science and STEM (science, technology, engineering and mathematics) subjects through a common interest in design, in ways that permeate academic boundaries. Related activities included attendance and participation in the *Low Carbon Energy for Development: Past Experiences and Future Challenges* conference at LU, organized by Dr. Ed Brown, and *Designing Place: International Urban Design Conference* at The University of Nottingham, organized by Dr. Katharina Borsi, further extending the opportunity to absorb a myriad of disciplinary perspectives.

The State and City of São Paulo provided a locus to explore emerging research funding agendas in the UK, Europe, and South America. The strategic aims of the initiative were to: contribute to the sustainability agenda; improve intercultural understanding and respect; and strengthen international links. The work extends an ongoing agenda towards consilience in design education through several topics explored by the authors over a five-year period [12, 13, 14, 15]. With respect to the most recent collaboration, some key themes and issues that emerged from the input of 55 participants in the two seminar events are reviewed and reported here. Before discussing this in detail it is helpful to briefly consider some approaches to studying the urban environment.

2. The complexity of urban systems

Urban systems are complex because of the multifarious connections that link people to place. 'Context' and 'form' relations are 'infinite' [1] and aspirations to assume a universal perspective are challenging. However, there have been recent calls for people who can assume an 'holistic' view to look beyond disciplinary differences to harvest and amalgamate knowledge from arts, humanities, social science, science, technology, engineering, mathematics, and design. Don Norman argues:

> We need to have people who understand complex systems, because that is what life and society is all about: systems. For this they must understand art and literature and music and philosophy and math, and science, and technology, and design. Design is what puts it all together. And don't forget the social sciences … [a]ll of society's systems are meant for people, so that has to be fundamental. [22]

This favors 'systems' as a central idea to unite different perspectives through design. For some time now, it has been recognized that design's sense of organization provides the capacity to 'deal with several layers of form-context boundaries in concert' [1]. If design is being singled out as having such ability, then urban design offers a wide disciplinary perspective to study the urban environment. But how? And what might be understood by the word 'system' to those who may function systematically but do not recognise systems as a primary motivating force in their impetus to solve problems. One approach has been to link narrow and wide design perspectives as in the case of *Graphic Design as Urban Design*, by locating this in different disciplines such as *Language Studies* and *Geography* [11].

What is meant by a systems approach in relation to the study of urban environments? In his discussion about 'studying the city', Needham [21] identifies three approaches: the 'systems approach', the 'ecological approach' and the 'approach of. These are briefly defined as:

Systems approach: a set of connected parts or things.

Ecological approach: interactions between an organism and its environment.

Approach of individualism: social relations, institutions, and traditions in terms of the interactions between individuals acting in certain social institutions.

Regarding the first, some of the ways a systems approach is used is outlined by Needham. These are paraphrased as follows: (1) examine the whole set rather than its parts for methodological advantage; (2) examine the whole set rather than its component parts because this yields increased worth; (3) examine the whole system and identify 'properties' that may be applied to other contexts through 'general systems theory'; (4) examine the parts and recognize the links between them. The first three all identify benefits from studying the whole but Needham favors the fourth because it emphasizes '*interactions* and *inter-relations* between urban components and activities', and on the basis that it is impossible to comprehend the urban system wholly. As mentioned earlier, form and context relations are infinite, suggesting an aspiration to understand the whole must remain an aspiration and can never be concrete. Needham supports his explanation with diagrams, reproduced and redrawn here as Figure 1, and goes on to explain how a 'partial system' may be understood by analyzing the parts and connections relevant to the particular problematic. Defining the system is therefore '*ad hoc*' and connections between parts are known in theory and articulate the '*causal* explanation'.
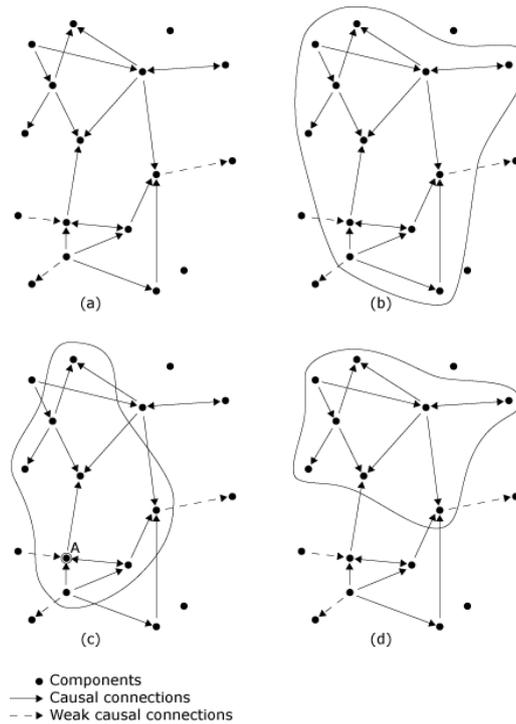
Figure 1. (a) Diagrammatic representation of a system. (b) The boundary of the whole system. (c) The boundary of a partial system. (d) The boundary of another partial system. [20] (Redrawn by Harland)

Norman's call for an understanding of complex systems depends significantly on design. Its role may be determined by Alexander's ideas about how design's organizational capacity manages several levels of complexity between 'form' and 'context'. In the case of sustainable urbanism all of the approaches to studying the city noted by Needham may be justified if a holistic approach is the aspiration. The complexity that Norman identifies might be thought of in terms of how the three approaches—systems, ecological and individualism—interact in a common design space. This is shown diagrammatically in Figure 2.
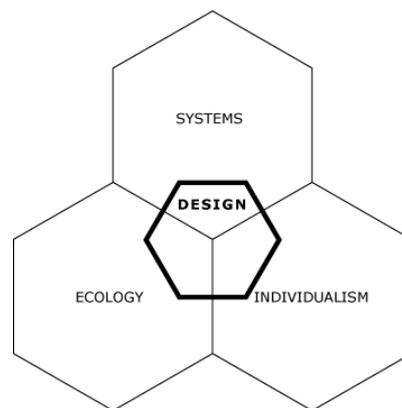
Figure 2. The complexity of systems, ecology and individualism synthesized as design.

In the case of studying urban systems, urban design appears to be confronting this challenge. As an emerging discipline, it is similar to '… those under the umbrellas of medicine or the social sciences, … occurring where its interests intersect those of traditional fields. It draws on and helps to create urban geography, engineering, environmental psychology, climatology and the management sciences' [19].

It appears that design must 'collage' together the parts and connections that form partial systems to address specific problems. But how can we know the different parts to understand the potential for connections to establish? The following account will describe how a design initiative attempted to address this question by identifying the themes and issues that researchers are interested in below the surface of their disciplinary identity. Under the semblance of '*sustainable urbanism*' that has arisen from urban design and architectural circles, linked to literature in geography, urban studies, sociology and the political sciences [6] a wide ranging set of concerns illustrate what design must come to terms with if it is to live up to the integrative promise identified by Norman.

3. Sustaining São Paulo

EPSRC Bridging the Gaps was a funded project bringing together researchers from the School of the Arts and the School of Social, Political and Geographical Sciences, at LU for a project entitled *Stimulating collaborative approaches to developing sustainable megacities through the complexity of urban design challenges: a case study on São Paulo*. The objectives were to encourage trans-disciplinary cross-sectorial discourse between arts, geography, philosophy, design and engineering, to produce innovative responses to contemporary urban challenges. Novelty in the project resided in the aspiration to combine academic disciplines, public/private sector input, and citizen participation at a time when recent economic, cultural and social developments in BRIC (Brazil, Russia, India and China) countries is resulting in rapid urban growth presenting intense sustainable urban design challenges.

The scheme allowed three academics from LU and the same from USP to visit respective institutions and participate in seminars, workshop, meetings and cultural exchange. The key beneficiaries are notable for the diversity of their expertise—art and design, hydraulic engineering, critical management studies, geography, philosophy, and water engineering—seemingly coming together for the first time. The seminar events at LU and USP initiated opportunity for 55 researchers to participate and contextualize their research in relation to sustainable urbanism, each from their own perspective. These covered diverse academic disciplines, support services and industrial sector participants. The following areas were actively represented: Hydraulic and Environmental Engineering; Architecture and Urbanism; Arts; Design; Sport, Exercise & Health Sciences; Water engineering (WEDC); Geography; Social Sciences; Information Science; Electronic, Electrical Systems Engineering; Civil and Building Engineering; Policy, Innovation and Systems Analysis; Energy Technology; Environmental Solid Waste; Law; Economic Development; Research support; and Enterprise activity.

The focus on São Paulo stemmed from an existing relationship between the authors of this paper. But more significantly the City of São Paulo embodies the unprecedented pace and nature of urban change in global cities since the mid-twentieth century. Furthermore, in relation to its foundation as a sixteenth century colonial settlement it has been called a 'critical point place' [12] and faces unique challenges arising from its urban development and social conditions. In the 1950s the city's motto *São Paulo não pode parar!* (*São Paulo cannot stop*) was augmented by the slogan 'fifty years in five' introduced by the then president Juscelino Kubtischek. It is an example of the dualisms inherent in a local metropolis in the global world as economic prosperity is paralleled by sharp economic inequalities. Such tension between the formal and informal city have yet to be comprehensively addressed and criticism persists at the failure to establish a comprehensive sustainable urban vision [26, 27]. Yet, the city is responding as a regional centre of expertise on education and sustainable

development with the aspiration to be a 'resilient city' [23]. Research on sustainable cities is increasingly integrating the concept of resilience. It implies the capacity of the city to withstand, adapt or respond to change, disaster and crisis. The concept of resilience not only encompasses urban adaptation to climate change, but is also applied to organizational forms of the city, social and economic processes and patterns of inhabitation. Within this is an implicit understanding of the systems approach in the sense that the level of resilience of a city is dependent on the quality and performance of the interaction and interdependence of all urban systems [16, 25].

The stated goals in the RCE São Paulo document aspire to reduce inequality by transforming areas of exclusion to areas of citizenship through sectorial activity. Through this the City identifies six key regional challenges in need of urgent attention:

- Education for sustainability
- Sustainable transportation
- Sustainable buildings
- Water and energy conservation
- Waste reduction and recycling
- Recovery of degraded areas

The City of São Paulo is a partial urban system, linked to other local, national and international settlements. The infinite number of perspectives this provides makes the comprehension of São Paulo, and the multitude of processes involved in establishing it as an urban phenomenon, a highly complex task. Who can understand such complexity? What knowledge is available to the future design of São Paulo if it is to benefit from a breadth of disciplinary diversity? The seminar events attempt the answer this final question by identifying in more detail the key themes and ideas from the range of research, professed in the name of sustainable urbanism at the two seminars. From this the following highlights some issues and possible relationships that link partial perspectives on urban sustainability and regional challenges outlined in the RCE São Paulo.

In extending discussion about São Paulo the following introduces some key challenges the city is confronting. Two tables are shown to reveal the range of interests from LU academics and a more focused set of presentations from USP seminar participants with a focus on solid waste.

4. Themes and issues to emerge from seminar events

At the LU seminar, three perspectives on São Paulo where offered by Prof. Dr. Mario Thadeu Leme de Barros Chair of the Department of Hydraulics, Sanitary and Environmental Engineering at the Polytechnic School (EPUSP), Prof. Dr. Maria Cecilia Loschiavo dos Santos, Chair of Design, School of Architecture and Urbanism (FAU), and Prof. Dr. Sylmara Gonçalves Dias, Critical management studies, School of Arts, Science and Humanities (EACH), all from the USP. Key themes and issues are drawn from presentations during a two-hour opening session.

This began with the staggering statistics associated with the City of São Paulo. For example, São Paulo state constitutes approximately 40% of the Brazilian population and is said to generate 40% of Brazilian GDP. Eleven million people live in the City generating 15% of Brazilian GDP. The city produces 15% of Brazilian exports (many through the largest sea port on the continent). It is the ninth richest city in the world and Brazil's financial

centre with the third largest stock market in the world. Much was said about its history as a city founded in 1554 to now boasting the 'number one' helicopter fleet worldwide.

Barros brought five key strategic themes to the attention of the audience, and also offered some solutions that are being implemented, under the 'banner' 'The city we want' as part of strategic plan for São Paulo 2040. These themes are as follows:

1. *Urban inequality* focused on housing deficit; segregation; the precarious circumstances for many in a mix of tenement housing, favelas and illegal settlements; the tension between horizontal and vertical development and the emergence of a compact city; the challenges of 'slum upgrading' and housing resettlement programmes.

2. *Environmental problems* focused on problems associated with urban water (discussed in more detail in Harland, *et al* [12]); soil contamination; waste and air pollution.

3. *Congestion and mobility* focused on public transport deficit and traffic congestion as a factor in everyday life (3hrs per day was suggested compared to the ideal of 1hr); public transport deficit; mobility and accessibility goals for better pedestrian circulation, bicycle lanes, train and subway/metro/underground expansion, urban corridors for bus routes, more strategic thinking about the road system and airport infrastructure, alongside a logistics platform for the cargo system.

4. *Sustainable urban development* focused on stopping 'urban sprawl'; infrastructure for better balance between housing and employment; better quality environment and housing, surfacing (roads etc.); and elimination of risk in areas; and the opportunity for the city to be constructed and re-constructed.

5. *Capital market potential* focused on the city's status as the financial capital of South America and the potential for the promotion of business opportunity aligned with a more desirable industrial sector incentivized for development.

Loschiavo dos Santos linked a discussion about poverty to solid waste and problems related to the formal and informal economy. Perennial problems of marginality, homelessness, poverty and low income in São Paulo were directly linked to the waste collection initiative and the work of catação (collection)—'a self created economy that reuses the trash and leftovers of Sao Paulo and other cities of Brazil.' For those involved in such endeavors, the economic benefit of recyclable material collecting sometimes reaches or surpasses the minimum wage. The study of waste has become a focus through a new initiative at the University of São Paulo, under professor Loschiavo's research group. This group aims to:

• Rethink how waste is managed using an integrated view.

• Create new methods and technologies for waste management.

• Examine how waste management polices can be implement through
  the public and private sectors and the society.

This initiative brings together scholars from a diverse scientific background with a multidisciplinary vision. This is in conjunction with Massachusetts Institute of Technology; University of Boras; Loughborough University; University of California, Los Angeles; University of Sheffield. The main focus of the research includes:

1. Local Government Policies, Population's Behavior & Minimization Efforts (behavior, public policies, product's design, economic incentives and others).

2. Materializing the Commodity Chain: the Surplus & Loss in Production (aspects economic, technological, regulatory of waste commodity exchange along supply chain).

3. Solid Waste Economies, Health & Spatial Divisions of Labour: ((i) waste economies in Brazilian cities and in a number of countries; (ii) all health issues related to waste management, and; (iii) the scavengers' work within the waste policies, economy and industry in Brazil and other countries).

4. The Transformation of Excess: Solid Waste Technologies (recycling, composting, incineration, aerobic/anaerobic digestion or landfilling, according to its physical and chemical characteristics).

The final speaker, Gonçalves Dias, discussed the topic of social inclusion of waste collectors in solid waste management, from the perspective of critical management studies. In particular she focused on the problems associated with 'plastics' in Brazil, as the third biggest consumer of 'PET' products in the world, with some 12 billion items discarded per annum. Her research focused on the integration of 'green competencies' into the supply chain. At present, Brazil recycles 54% of PET products in a country that does not deploy a selective waste collection process. Amongst the many problems associated with the process, she identified 'managerial, technical and operational' challenges faced by industry (the formal recycling sector) and the importance of waste collectors (the informal recycling sector) in the recycling chain for PET products. She argued that 'the collectors are fundamental to the whole industry recycling field, but they live in a situation of fragilities and precarities.' These circumstances set the 'manufacturers and brokers' involved in industrial production against the collectors who work in 'vulnerable and fragile' yet essential circumstances that contribute to operational matters through the organizational structures of cooperatives. However, the formal sector benefits disproportionately from the economics of waste collection whereas the informal sector made up of waste collectors and the cooperatives lack the economic, social and institutional benefits from their work.

Theses introductions provided a glimpse of the context for some of the sustainability issues faced in São Paulo. A number of themes emerged from the spoken aspect of the presentations and some are noted here to illustrate the richness of the discussion and potential for participation, as follows: ethical issues; corporate sponsorship; Rio Plus 20; education for development; towards São Paulo 2040; city history and rapid growth; new campus development at Universidade de São Paulo; Amazon River water exploration; river pollution; landscape neglect; growth versus consolidation; economy of material re-use; waste collectors' knowledge; 'bottom-up' approach to waste collection; lack of selective waste collection; citizen behavior; absence of solid waste master plan; research initiatives for urban solid waste at USP; education and knowledge dissemination; technology/knowledge transfer; critical management ; employment potential; informal/formal economy; fragility/ precariousness; conversion of waste to energy; widening participation; logistics communication; institutional collaboration; design as a response.

This *ad hoc* list shows the diverse range of concerns in a city as complex as São Paulo. Clearly, issues will not be resolved by disciplinary perspectives alone and require input from many that cross science, social science, arts and humanities subjects. But the question of how different disciplines might work together is unclear beyond a model for interdisciplinarity, a concept that may work in formal settings (e.g. academia and industry) but less familiar to the informal sector (e.g. circumstances of waste collectors and collection).

Following the three perspectives discussed above, further shorter presentations from Loughborough University staff revealed more diversity in matters relating to sustainable urbanism. The full list of speakers is shown in Table 1. Space does not allow a full summary here of each researchers' particular interest, but the indication here will provide some sense of the infinite number of perspectives that emerge from this kind of knowledge exchange activity. A similar event in USP mirrored the LU format but focused on the topic of solid waste in response to one

of the six key regional challenges in need of urgent attention mentioned earlier. Table 2 similarly lists the diverse range of disciplinary perspectives, as well as some European partners keen to share expertise. Existing initiatives and schemes are mentioned in the list alongside other aspirations.

Table 1. Loughborough seminar speakers from Loughborough University

Participant	Discipline	Research interest
Dr Ed Brown & Dr Jon Cloke	Geography	Latin America Energy Cross-disciplinary and cross-sectorial interests in energy and development International trade and development policy in Latin America Corruption and Governance Globalization and world cities Corporate social responsibility
Dr Robert Harland	Arts	Graphic objects in urban objects Affective mesographic intervention
Professor Marsha Meskimmon	Arts	Global ethics and contemporary art Precarious ecologies
Dr Faith Kane	Arts	Pervasive textiles – Laser techniques – Biotechnology – Sustainable materials
Lingqi Kong	Arts	Evaluating local/global cultural factors in wayfinding Beijing case study
Dr Mark Hepworth	Information Science	People's information behavior Knowledge, data and information management
Dr Debra Lilley	Design	Sustainable design research group – products, services and systems – people – strategy – making connections – education – methods and tools
Luis Oliviera	Design	Energy use in domestic environments
Prof Stephen Ison	Civil and Building Engineering	Environment and sustainability Air transport Mobility management Transport technology, GIS, road safety
Ian Smout	WEDC (Water, Engineering and Development Centre)	Urban water management (technical, social, economic and management issues)
Dr Richard Blanchard	CREST (Centre for renewable energy systems technology)	Wind, photovoltaics, solar thermal, buildings, electricity networks, energy systems Urban-rural divide, rural hybrid energy enterprise systems, organic matter to methane gas, ocean energy systems, biogas, biofuel, rice husk, municipal waste, sustainable livelihoods, energy recovery
Dr Kersten Leder Macklay	LEEDR (low effort energy demand reduction)	Social research for everyday energy and digital media use in the home, routes, activities, practices as opportunity for digital intervention
John Atkin	Arts	Case study on public art in urban design
Mark Smith	Arts	Primary school art education

Table 2. Issues arising from São Paulo seminar speakers from University of São Paulo with a focus on 'Waste'

Participant	Discipline	Research themes and interest
Prof Nelson Gouveia	School of Medicine	The importance of health and solid Waste issues 99% solid waste sent to landfill / transportation Population proximity No incineration Recycling is the main issue Waste collecting now a recognized 'profession'; Guidelines & education is much needed
Tasso-Cipriano	School of Law	Waste Law Soil contamination law exists only in São Paulo Solid waste is a priority Distinction between waste / product Shared responsibility for product lifestyle Design for recycle and reuse 'Take back' is important More provision for packaging Consumer rights and duties need attention Waste prevention is a must
Prof Denise Spinosa	Sanitary and Environmental Engineering at the Polytechnic School	LAREX (Recycling waste) www.pmt.usp.br/larex Aluminium, mobiles, batteries etc. River contamination Main equipment
Prof Tereza Cristina Carvalho	Sanitary and Environmental Engineering at the Polytechnic School	50,000 computers in USP Cell phone change rates are reducing 'Green seal' as a USP action 4000 computers purchased per year by USP No proper legislation ECO Design needs more profile LASSU training pickers
Prof Maria Cecília Loschiavo dos Santos	Architecture and Urbanism	Waste management is not new Re-attribution of value to garbage Collectors' knowledge of urban life Religious celebration is a key source
Hannah Archuschin Machado / Grupo Motropole Fluvial	Architecture and Urbanism	National policy for water resources Eco Portos
Prof Sylmara Goncçalves Dias	Arts, Science and Humanities	Sustainable thinking Economic / environmental / informal economy How to connect the formal/informal economy
Prof Mariangela Wanderley	Social Sciences	Design of disposal Criticism & Practice of Design Object focus
Rafael Galvåo	Environmental Science	Commerce of the collectors
Jessica Magnusson	SP Technical Research Institute, Sweden	Waste management in the City of Borås
Professor Jorge Tenório	Metallurgical and Materials Engineering	Interdisciplinary collaboration

5. Conclusion

From this diverse range of key words and phrases (only the speakers are listed here from a total of 55 participants) it is possible to gauge the complexity that design must absorb if it is to fulfill the potential identified by Norman. The above reveals a more intricate scenario than can be known through the simpler nomenclature of higher education's division of knowledge that fits conveniently into arts, humanities, social science, science, technology, engineering, mathematics, and design, and other disciplines, subjects and fields of interest. Design will need to consider how it reconciles individual interests that might set the concerns of a modern and contemporary art historian and theorist with an interest in the work of women artists and gendered subjectivity (e.g. Meskimmon), alongside the interests of a civil engineer interested in the implementation of new paradigms for flood control measurements and the relationship between the natural hydrological characteristics and the new urban occupation (e.g. Barros).

Ideas to unite such diverse perspectives have been previously offered by the authors of this paper through the process of affiliation in design education. The research reported here puts that into practice by bringing together diverse disciplinary perspectives. Many themes emerge around which some may unite, such as the 'precarious

ecologies' mentioned by Meskimmon, so closely aligned with the lifestyle of many urban poor in São Paulo. Or the methods and tools available in sustainable design research might be extended to incorporate those of the art historian. Some of this potential will inform the next phase of this research.

Furthermore, reflection about sustaining Sao Paulo provides the opportunity of rethink the role of design. In the sense argued by Tony Fry [9] 'one of the consequences of taking design seriously as a field of political action has been to evolve a practice that refuses to locate it in a single design discipline – this means, for instance, working across visual communication, industrial design, architecture and urban design'. This perspective is strategic in the current unsustainable circumstances São Paulo finds itself in. But 'people generally equate design with the things they see in lifestyle magazines' [3] and in so doing people forget that design is a 'directional practice' [9]. Design designs the world and 'everything designed goes on designing' [9].

São Paulo remains among the world's largest cities of more than 20 million people, yet urban poverty remains a perennial condition. The group of scholars who have participated in this research initiative express a concern for social and environmental justice through design, in order to mind and reduce the gap between different levels of urban society.

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